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ENTOMOLOGICAL NEWS

DECEMBER, 1933

Vol. XLIV No. 10

CHARLES WILLISON JOHNSON
1863-1932.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

United States and possessions, Central and South America	$3.00
Canada	3.15
Foreign	3.25

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

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ENTOMOLOGICAL NEWS

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Butterfly Clouds, their Origin and Infrequent Occurrence (Lepid.: Pieridae).

By J. R. HASKIN, Auburndale, Florida.

A study of *Eurema jucunda* recently has led my imagination far afield bringing to me visions of clouds of butterflies darkening the skies, showers of "Red Rain" such as has been recorded from time to time since the first century A.D., emigrations of enormous swarms from one place to another. In Dr. Holland's first Butterfly Book is a most intriguing account of some historical "showers of blood." Again we have accounts of clouds of butterflies and of enormous traveling swarms or flights of butterflies. (I am referring to those phenomena which happen only occasionally and not to the regular flights of such butterflies as *plexippus,* our lordly monarch.)

How is it possible for such masses of butterflies to assemble? Perhaps these observations will add to what is already known about the matter.

For years I have had the vague idea that under extremely favorable conditions a large brood might develop but not until the summer of 1932 could I grasp a possible solution. Ordinarily nature takes care to prevent these undue happenings. Storms, winds, driving rains, the attacks of living enemies on eggs and larvae, the destruction of eggs and pupae by parasites which have introduced eggs into them, all these act to kill off hordes of developing insects.

I have seen and noted many such things. I have seen the cultivated passion vine so infested with the larvae of *D. vanillae* as to be almost destroyed, and yet hardly a handful of the pupae developed butterflies for their insides had all been eaten by parasites.

Last February I gathered a dozen eggs of *A. monuste* laid on nasturtium, leaving great clusters of eggs on the growing plants. Then came a severe driving wind and rain storm thrashing plants, branches, leaves, beating them to the ground

and splashing them with mud. The eggs placed in a breeding cage all developed perfectly but on the day after the storm not an egg was to be found on the nasturtium in the garden. And furthermore, not a single *monuste* have I seen in this vicinity since that happened over eight months ago.

On September 11, 1932, there was a great swarm of *E. nicippe* along an old road near my present home, passing through a strong, young patch of freshly grown *Cassia tora*. I gathered several plants covered with eggs after watching the female *nicippe* depositing them. Ten days later I revisited this spot and found the plants in some places with the leaves eaten into mere ragged semblance of their former selves. And yet a close search failed to find a single larva or pupa. The eggs in my breeding cage had all hatched and I had about fifty flourishing larvae. The leaves of the food plant had been eaten just as had been those in the field. In fact it was that that led me back for a fresh supply. By October 5, all my larvae had developed into butterflies but in the open field only a few scattered specimens were to be seen. During the first ten days of this period we had had several fairly heavy rains and some wind. Either these rains or living enemies had destroyed the thousands of partly grown larvae in the field.

Many observations such as these might be cited, to show how the balance of Nature keeps the land from being overwhelmed with insect life. But occasionally certain conditions seem to combine to get the best, or rather the worst, of this balance. Then we have swarms of *A. californica* such as are reported from California, clouds of *E. lisa* floating over the Bermudas as described by Jones, flights of *A. monuste* drifting over southeastern Florida for days at a time, as my father has observed. I have seen the same sort of flights twice in California, once in 1907 when a great flight of *V. cardui* drifted south over Los Angeles for five days, and again when tremendous numbers of the same species drifted northwest over Tulare in the San Joaquin Valley of California in 1924.

All these occurrences have seemed more or less a mystery accustomed as I have been to thinking in terms of single brood, double-brood, and even triple brood butterflies, in which a brood has implied *one* generation. It remained to make a prolonged study the summer of 1932 of *E. jucunda* to learn that

in such a climate as Florida's a brood or seasonal growth of butterflies may not mean a single generation but many generations.

All through July of 1932 I had observed *E. jucunda* flitting over my lawn. Finally in August I watched a female laying eggs on a small creeping vetch, *Aeschymomene viscidula*, common in this region. Gathering 25 eggs I started a study of *jucunda*. The eggs hatched in three days, the larvae developed in about 12 days. Five days later I had released the new generation of butterflies. It took about twenty days from the egg to the imago. Meanwhile on my lawn and in the open woods nearby *jucunda* was flying in fair numbers all through July, August, September and October. Almost any day I could go out, follow a female a few minutes and gather some fresh laid eggs. If it were not that *jucunda* and its larvae are small and rather delicate, that the food plant has small leaves and is a lowly creeping plant, and that winds and driving showers have been very frequent during this period, one could well imagine swarms of jucunda in the *district*.

Consider the progeny of one female under absolutely one hundred per cent favorable conditions for breeding and developing such as one provides in the breeding cage. It may lay a hundred eggs during its lifetime and in twenty days we may imagine fifty new *pairs* on the wing. In possibly twenty-five days more, the fifty females will have produced 5,000 young of which 2,500 would probably be females. Another 25 days and the original single female would have 250,000 great-grandchildren, all in the space of seventy days. We can then begin to realize how, under extremely favorable conditions, a few thousand individuals of a species can easily raise a perfect cloud of progeny. Then, the favorable food supply having been eaten up or otherwise destroyed, this enormous brood migrates. I doubt if there is any particular instinct as to the direction of the migration but probably instinct does cause them to move away from the barren area where the food supply has been exhausted.

a very different world from the one we enjoy today.

How fortunate it is for us then that Nature's forces as a difference in these checks and balances would have resulted in rule, act in such a way as to balance all things. Only a slight

A Preliminary List of Indiana Neuroptera.

By B. Elwood Montgomery, Purdue University and
A. W. Trippel, Mishawaka, Indiana.

The first record of Neuroptera in Indiana appeared in the paper on North American Neuropterous Insects by Thomas Say, published posthumously in 1839,[1] in which *Formicaleo grata* was described from Indiana, although two species recorded from the Northwest Territory by Say in 1823[2] may have been taken within the state. Hagen quoted these records in 1861[3] but the next direct record, and the only other one which we have been able to find did not appear until 1903,[4] when K. C. Davis reported *Chauliodes rasticornis* Rambur from Sullivan.

When Professor Roger C. Smith of Kansas Agricultural College informed us recently that there were few published records of Neuroptera from this state, we sent him all the specimens of the order which we could find in the Purdue Collection or in the collections of Purdue entomologists. These specimens were determined by Professor Smith and were used in compiling the following list.

This list adds 27 species and varieties to the two species already known from Indiana. Many of these have long been known to be regional for the state and lack of records has been due to a lack of interest in the order by collectors working in Indiana. Professor Smith wrote, "There was nothing very surprising about the collection, except the *Dendroleon;* I did not know that it extended so far east."

Specimens from Clark County were collected by students at the Purdue Forestry Camp in the Clark County State Forest at Henryville. Most of the specimens from Tippecanoe County were collected by students enrolled in entomology classes at Purdue University. In each case in which it is known, the name (or initials if one of the authors) of the collector is placed in parenthesis following the record of collection.

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[1] Jr. Acad. Nat. Sci. Phil., *8*: 9-46.
[2] Godman's Western Quart. Report., *2*, (2):160.
[3] Syn. Neur. N. Amer., Smithsonian Misc. Coll.
[4] N. Y. St. Mus. Bull. *68*: 442-486.

If a specimen is retained in the collection of the collector the name or initials of the collector are starred (*); all other specimens, except as indicated otherwise, are in the Purdue Collection.

All records without indication of the year are for the 1932 season. The arrangement within families is alphabetical by genera, species, and varieties, respectively.

SIALIDAE.

1. CHAULIODES CONCOLOR Davis. Clark Co., June 23, 1931; Tippecanoe Co., May 25 (in Coll. Roger C. Smith).

2. C. PECTINICORNIS Linn. Clark Co., July 27, at light; Tippecanoe Co., May 28 and June 2, 1923, May 18, 1931, "Purdue library," May 11, under street light (R. C. Kellar), May 20, at light.

3. C. RASTICORNIS Rambur. Sullivan Co., reported from Sullivan by Davis.[4]

4. C. SERRICORNIS Say. Tippecanoe Co., May 10, 1930 (R. R. Heaton).

5. CORYDALIS CORNUTA Linn. Cass Co., Logansport, June 24, 1916; Clark Co., July 12, 1930; Green Co., 1895; Knox Co., Vincennes, July 31, 1924 (B. E. M.); Parke Co., Turkey Run State Park, Aug., 1932 (F. H. Test. Determined by the authors); Tippecanoe Co., —, 1914, June 15, in wood, July 6, at light (B. E. M. in Coll. Roger C. Smith).

6. NEOHERMES ANGUSTICOLLIS Hagen. Clark Co., July 4, 1931.

7. N. FILICORNIS Banks. Clark Co., June 24, July 20, at light.

MANTISPIDAE.

8. MANTISPA BRUNNEA Say. Knox Co., Aug. 19, 1929, in syrup bait trap (W. P. Yetter, Jr., in Coll. B. E. M.).

HEMEROBIIDAE.

9. HEMEROBIUS HUMULI Linn. Tippecanoe Co., Apr. 12, 13 (G. B. Cummins) and 14, 1930, six specimens from Apr. 15 to May 21, 1931 (one each collected by L. I. Musgrave* and T. Harrison), some of these at light, Apr. 15, June 15; White Co., Freeman Lake, July 20 (E. M. Heiss. in Coll. B. E. M.).

10 H. STIGMATERUS Fitch. Tippecanoe Co., Apr. 6, sweeping weeds (C. Yarwood) and 10, 1930; May 21, in swamp (J. W. Ham).

11. MICROMUS POSTICUS Walker. Porter Co., Mineral Springs, Sept. 1, 1925, three specimens by sweeping vegeta-

tion in maple zone of tamarack swamp (B. E. M.*); Tippecanoe Co., Apr. 10, 1931, sweeping.

CHRYSOPIDAE.

12. CHRYSOPA HARRISII Fitch. Tippecanoe Co., June 2, 1926.

13. C. OCULATA Say. Clark Co., July 4, 1931; St. Joseph Co., Aug. 22, sweeping ragweeds (A. W. T.); Tippecanoe Co., May 12, 1915, May 16 and 18, 1931, nine specimens from May 1 to 24, some of these at light, others by sweeping vegetation.

14. C. OCULATA var. ALBICORNIS Fitch. Tippecanoe Co., May 25 and 30.

15. C. OCULATA var. BIPUNCTATA Fitch. Tippecanoe Co., May 20, June 7, sweeping grass (A. W. T.), July 1 (B. E. M.).

16. C. OCULATA var. CAREI Smith. Vigo Co., Apr. 7, in clover; one unlabelled.

17. C. OCULATA var. CHLOROPHANA Burmeister. Tippecanoe Co., May 19, 1930, May 11.

18. C. OCULATA var. ILLEPIDA Fitch. Tippecanoe Co., Oct. 13, 1930 (G. E. Lehker), May 17 (L. I. Musgrave*) and 24 at light, June 17, sweeping grass (A. W. T.*).

19. C. NIGRICORNIS Burmeister. Tippecanoe Co., 11 specimens, May 15-25, sweeping vegetation, at light, etc.

20. C. PLORABUNDA Fitch. Clark Co., July 15, 1931; Posey Co., Poseyville, July 11, 1929, sweeping (B. E. M.*); Tippecanoe Co., May 20, 1926, May 9, 1930, Oct. 15, 1930, at light (A. W. T.*), Nov. 12, 1930, May 5, 1931, sweeping (A. W. T.*), five specimens from Apr. 10 to Nov. 10, 1931, Apr. 21 and Oct. 1 (both by L. I. Musgrave*).

21. C. QUADRIPUNCTATA Burmeister. Tippecanoe Co., May 16, 1931.

22. C. RUFILABRIS Burmeister. Tippecanoe Co., June 28, 1928 (H. K. Riley).

MYRMELEONIDAE.

23. DENDROLEON OBSOLETUM Say. Clark Co., one specimen summer of 1931 and four July 18-31, 1932; Morgan Co., June 12, 1931 (L. I. Musgrave. in Coll. Roger C. Smith).

24. GLENURUS GRATUS Say. Green Co., July 23, 1895; Vanderburg Co., "near Evansville" (type locality), recorded by Say.[1]

25. HESPEROLEON ABDOMINALIS Say. Clark Co., June 20, 1931; Tippecanoe Co., June 7, 1921.

26. MYRMELEON IMMACULATUS DeGeer. Clark Co., June 15.

ASCALAPHIDAE.

27. COLOBOPTERUS EXCISUS Hagen. Lawrence Co., near Bed-

ford, July 10, 1929, on an apple branch with the specimen of the following species of this date (J. J. Davis).

28. ULULODES HYALINA Latreille. Lawrence Co., July 10, 1929, with the preceding species and the two thought by the collector to be a mating pair (J. J. Davis), orchard near Mitchell, July 24, 1931 (G. E. Marshall. in Coll. B. E. M.).

29. U. QUADRIMACULATA Say. Clark Co., two specimens, summer of 1931 (one in Coll. Roger C. Smith).

Notes on Utah Heteroptera.[1]

By GEORGE F. KNOWLTON.

This paper lists a number of species of Heteroptera not heretofore recorded from Utah and adds to the known distribution of other forms. The writer is indebted to Mr. H. G. Barber for the identification of many of the species here reported.

PENTATOMIDAE (Leach).

EUSCHISTUS ICTERICUS (Linn.). Farmington, July 23, 1930 (M. J. Janes).

COENUS DELIUS (Say). Logan, July 11, 1931 (W. L. Thomas).

NEOTTIGLOSSA SULCIFRONS Stal. Logan, August 22, 1908 (J. B. Horton); Salt Lake City, July 14, 1904.

COSMOPEPLA CONSPICILLARIS (Dall.). Soldier Creek, June, 1928 (Knowlton).

COREIDAE (Leach).

LEPTOGLOSSUS OCCIDENTALIS Heid. Blue Creek, August 17, 1931 (Knowlton, Janes); Logan, February 18, 1930 (L. Stirland); Snowville, June, 1931 (Knowlton).

L. CLYPEALIS Heid. On *Atriplex rosea* at Blue Creek, August 17, 1931 (Knowlton, Janes); Fort Duchesne, June 23, 1931 (R. L. Janes); Logan and Trenton on August 17, 1931 (Knowlton, Thomas).

ALYDUS EURINUS (Say). Logan, October 17, 1909.

A. PILOSULUS H. S. Myton, August 23, 1932 (L. Cutler).

A. CONSPERSUS Montd. Fort Duchesne, August 25, 1930 (R. L. Janes); on alfalfa at North Ogden, August 16, 1929 (H. J. Pack); Providence (Janes).

TOLLIUS CURTULUS (Stal). Logan (Knowlton).

T. SETOSUS (Van D.). Logan, July 3, 1931 (Thomas).

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station, Logan, Utah. Publication authorized by the director, February 20, 1933.

HARMOSTES REFLEXULUS (Say). Amalga, August 31, 1927; Hatton, May 5, 1927; Honeyville, May 11, 1931 (Knowlton).

AUFEIUS IMPRESSICOLLIS Stal. Bear River City, July 22, 1929, and on sugar-beets at Ogden, August 18, 1927 (Knowlton).

CORIZUS HYALINUS (Fabr.). Corinne, July 8, 1929; on beets at Lehi, July 25, 1927; Provo, July 13, 1927 (Knowlton).

C. LATERALIS (Say). Kanosh, June 25, 1927; on sugar-beets at Thatcher, July 30, 1929; on *Sophia sophia* at Snowville, May 24, 1930 (Knowlton).

NEIDIDAE (Kirk.)

NEIDES MUTICUS (Say). Spring Canyon, August 28, 1925 (Knowlton).

JALYSUS SPINOSUS (Say). Logan, August 7, 1931 (Thomas); on sugar-beets at Nibley, August 28, 1930 (Knowlton).

LYGAEIDAE (Schill.).

LYGAEUS BICRUCIS Say. Logan, September 7, 1931 (Thomas).

GEOCORIS PALLENS Stal. Delta, June 24, 1930 (Clarke); Logan Meadows, September 11, 1929 (Knowlton).

G. PALLENS DECORATUS Uhl. Amalga, Flux, Grantsville, Kelton, Monticello, Moab, Ogden, Orr's Ranch, Portage, Salt Lake City, Snowville, Skull Valley, Trout Creek, and Vernal (Knowlton).

G. ATRICOLOR Montd. Taken upon alfalfa at Logan, September 18, 1932; a specimen attacked the beet leafhopper, *Eutettix tenellus* (Baker), when placed with it in a small cage (Knowlton); Layton; Providence (D. M. Hammond); Salt Lake City.

HETEROGASTER BEHRENSII (Uhl.). Logan, June 15, 1931 (Thomas).

CROPHIUS IMPRESSUS Van D. Ephraim, June 15, 1904.

SPHAEROBIUS INSIGNIS (Uhl.). Brigham, August, 1914 (E. G. Titus); Logan, October 4, 1909.

PERITRECHUS SASKATHEWANENSIS Barber. Northern Utah (Knowlton).

TINGIDIDAE (Lap.).

PIESMA INCISA McAtee. Monument (Knowlton).

P. CINEREA (Say). Richfield, August 7, 1904.

CORYTHUCHA PADI (Drake). Logan Canyon, August, 1929, and Lake Point, June 17, 1927 (Pack).

C. ARCUATA (Say). Camp Williams, July 3, 1929; Ogden,

June 9, 1927 (Knowlton); Logan; Mt. Pleasant, August 20, 1929 (Pack).

C. MORELLI O. and D. Kanab, June 26, 1927 (Knowlton); Thompsons, August 9, 1906.

C. MARMORATA (Uhl.). Stansbury Island, June 13, 1913 (Pack, Hagan, Titus).

C. IMMACULATA O. and D. Logan Peak, July 10, 1908 (J. R. Horton); Logan; Salt Lake City.

C. DISTINCTA O. and D. Bountiful, May 1, 1927, and Brigham City, June 21, 1929 (Knowlton).

REDUVIIDAE (Latr.).

REDUVIUS PERSONATUS (Linn.). Benson, July 6, 1929 (Knowlton); Snowville, September 21, 1932 (Cutler).

RASAHUS BIGUTTATUS (Say). Venice, California, July 22, 1924 (Knowlton).

ZELUS SOCIUS Uhl. Iosepa, August, and St. George, June, 1929 (Knowlton).

Z. RENARDII Kolen. St. George, June 9, 1928 (Knowlton).

MIRIDAE (Hahn).

MIRIS DOLABRATUS (Linn.). Salt Lake City, June 14, 1904.

TRIGONOTYLUS BREVIPES Jak. On sugar beets at Lehi, July 25, 1927 (Knowlton).

PHYTOCORIS LAEVIS (Uhl.). Santaquin, September 20, 1927 (Knowlton); Soldier Summit, August 13, 1906.

DERAECORIS BAKERI Knight. Cache Junction, 1907 (Titus).

D. ATRIVENTRIS Knight. Soldier Summit, August 13, 1906.

CLIVINEMA MEDIALIS Knight. Richfield, August 7, 1904.

DACERLA INFLATA (Uhl.). Cache Junction, Logan and Logan Canyon (E. D. Ball).

ORECTODERUS OBLIQUUS Uhl. Logan Canyon, July 6, 1908 (Ball).

COQUILLETTIA INSIGNIS Uhl. Park Valley, June 28, 1929 (Knowlton).

STRONGYLOCORIS ROBUSTUS (Uhl.). Monroe, July 25, 1906.

LOPIDEA DAKOTA Knight. Fort Duchesne, August 28, 1932 (C. J. Sorenson).

HADRONEMA BREVIATA Knight. Monroe, July 25, 1906.

PHYLLOPIDEA PICTA (Uhl.). Logan, July 30, 1904.

ORTHOTYLUS VIRIDICATUS Uhl. Bothwell, June 2, 1931 (Knowlton).

O. ANGULATUS (Uhl.). Smithfield, July 6, 1907 (Titus).

MELANOTRICHUS COAGULATUS (Uhl.). Upon *Sophia sophia* at Snowville, July 16, 1930 (Knowlton).

LABOPIDEA ALLII Knight. On sugar-beets at Hyde Park, August 2, 1929 (Knowlton).
L. CHLORIZA Uhl. Brigham, July 21, 1907 (Titus).
L. VIRIDULA Knight. Fort Duchesne, June 15, 1932 (Stoffers).
GERHARDIELLA RUBIDA Popp. Fort Duchesne, July 18, 1932 (Stoffers).
PLAGIOGNATHUS MOERENS Reut. Sevier, June 27, 1927 (Knowlton).

On the Hesperiidae Described by Mr. A. G. Weeks, Jr. (Lepidoptera)

By E. L. BELL, Flushing, New York.

Through the courtesy and co-operation of Mr. D. Marston Bates, of the Museum of Comparative Zoology, Harvard University, Cambridge, Mass., the writer has had the privilege of examining the type of the various species of *Hesperiidae* described by Mr. A. G. Weeks, Jr., now in that Museum.

Mr. Weeks, in the majority of his descriptions, did not attempt to place his species definitely in their respective genera but merely used a blanket generic term for certain groups and thus placed together insects which in some cases are not closely related, and as the details of superficial sexual characters are generally omitted from the descriptions it has been impossible accurately to place many of the species in their proper genera. Some of the species are represented only by females and these cannot always be properly placed without knowing what the male is like, and they are here placed as nearly as possible in their correct genera as the lack of knowledge of the male permits.

The specimens from which the original drawings were made bear a label to that effect and in most of his species Mr. Weeks has attached to one of the specimens a label reading "Type" but in a few cases this label has been omitted.

A considerable number of the insects described by Mr. Weeks have been omitted from Volume V of Seitz's Macrolepidoptera of the World.

var. ALEXANDERI Weeks, THYMELE PERVIVAX. 1906, Psyche, xiii, p. 71. 1911, Ill. Diurn. Lep., ii, p. 15, pl. ix. Suapure, Venezuela. Genus *Chrysoplectrum*. A synonym of *bahiana* Herrich-Schaffer. The type is a male.

ALLENI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 85, 1905, Ill. Diurn. Lep., i, p. 71, pl. xxvii, fig. 1. La Paz, Bolivia. Genus *Dalla*. The type is a male.

ALLIANCA Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 93. 1905, Ill. Diurn. Lep., i, p. 83, pl. xxxiii, fig. 1. Bolivia. Genus probably *Cobalus*. The type is a female.

AMBROSEI Weeks, CARYSTUS. 1906, Psyche, xiii, p. 67. 1911, Ill. Diurn. Lep., ii, p. 18, pl. xi, fig. 2. Suapure, Venezuela. Genus *Metrocles*. Allied to *leucogaster* Godman. The type is a female.

ARGENTEA Weeks, PAMPHILA. 1901, Can. Ent., xxxiii, p. 296. 1905, Ill. Diurn. Lep., i, p. 53, pl. xv, fig. 2. Cusilluni district, Bolivia. Genus probably *Mucia*. The stigma of the male type is similar though not exactly the same as found in the genus *Mucia*.

ARTIEI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 91. 1905, Ill. Diurn. Lep., i, p. 79, pl. xxx, fig. 2. Coroico, Bolivia. Genus *Lerema*. A synonym of *idee* Weeks. The type is a male and lacks the abdomen but there are two paratypes.

BARBARA Weeks, PAMPHILA. 1902, Can. Ent., xxxiv, p. 138. 1905, Ill. Diurn. Lep., i, p. 75, pl. xxviii, fig. 3. Bolivia. Genus *Artines*. Closely related to, if not a synonym of, *aepitus* Geyer. The type is a female.

BENCHOS Weeks, CARYSTUS. 1909, Ent. News, xx, p. 263. 1911, Ill. Diurn. Lep., ii. p. 28, pl. xx. 200 miles north of Cochabamba, Bolivia. Genus *Carystoides*. The type is a female.

BOBAE Weeks, PAMPHILA. 1906, Ent News, xvii, p. 203. 1911, Ill. Diurn. Lep., ii, p. 11, pl. vii, fig. 1. Suapure, Venezuela. Genus *Pellicia*. The type is a male and has the characteristic hair-tuft from the basal costal area of the upper side of the secondaries.

BRIDGMANI Weeks, THYMELE. 1902, Proc. New England Zool. Club, iii, p. 6. 1905, Ill. Diurn. Lep., i, p. 89, pl. xxxviii, fig. 1, Bolivia. Genus *Goniurus*. Allied to *ridens* Hewitson, with which the form of the genitalia shows considerable similarity. The type is a male.

BRIQUENYDAN Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 87. 1905, Ill. Diurn. Lep., i, p. 82, pl. xxxii, fig. 1. La Paz, Bolivia. Genus probably *Atrytone*. The type is a female.

BROOKSII Weeks, PAMPHILA. 1906, Ent. News, xvii, p. 204. 1911, Ill. Diurn. Lep., ii, p. 11, pl. vii, fig. 2 Suapure, Venezuela. Genus *Orphe*. The peculiar stigma of the male type, seamed with longitudinal lines giving it an undulate appearance,

allies *brooksii* with *Orphe vatinius* Godman, which has a stigma of similar construction, according to the description.

BRYANTI Weeks, PAMPHILA. 1906, Can. Ent., xxxviii, p. 175. 1911, Ill. Diurn. Lep., ii, p. 27, pl. xviii, fig. 2. Suapure, Venezuela. Genus *Eutychide*. The male type and two male paratypes have the typical stigma of this genus. Although the three specimens are undoubtedly con-specific no two of them are exactly alike in the extent of their maculation; one has two spots in the cell of the primaries, one has a single spot and the other one has none. The one with the two spots is apparently the one which Mr. Weeks has figured.

BUFFUMI Weeks, AETHILLA. 1906, Can. Ent., xxxviii, p. 174. 1911, Ill. Diurn. Lep., ii, p. 26, pl. xviii, fig. 1. Suapure, Venezuela. Genus *Telemiades*. A synonym of *amphion* Geyer. The type is a female.

CALIFORNICA Weeks, PRENES. 1902, Proc. New Eng. Zool Club, iii, p. 11. 1905, Ill. Diurn. Lep., i, p. 63, pl. xxii, fig. 2. Lower California. Genus probably *Prenes*. Type is a male.

CHINGACHGOOK Weeks, ATRYTONE. 1909, Ent. News, xx, p. 264. 1911, Ill. Diurn. Lep., ii, p. 30, pl. xxi, fig. 2. Suapure, Venezuela. Genus probably *Atrytone*. The type is a female.

CHINOBA Weeks, PAMPHILA. 1906, Can. Ent., xxxviii, p. 175. 1911, Ill. Diurn. Lep., ii, p. 25, pl. xvii, fig. 2. Suapure, Venezuela. Genus *Zopyrion*. A synonym of *satyrina* Felder, which Mr. Weeks has noted by placing a box label bearing that name under his label *chinoba*. The type series consists of twelve specimens, with no specific type marked; but the figured specimen, which Mr. Weeks usually called the type, is a male.

COROICANA Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 79. 1905, Ill. Diurn. Lep., i, p. 56, pl. xvi, fig. 2. Near Coroico, Bolivia. Genus *Lerodea* (*Megistias auct.*). The abdomen of the type is missing so the sex is uncertain.

COROICONENSIS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 92. 1905, Ill. Diurn. Lep., i, p. 84, pl. xxxiii, fig. 2. Coroico, Bolivia. Genus *Metiscus*. A synonym of *atheas* Godman. The type is a male.

CUADRADA Weeks, PAMPHILA. 1901, Trans. Amer. Ent. Soc., xxvii, p. 359. 1905, Ill. Diurn. Lep., i, p. 78, pl. xxix, fig. 3. Near Coroico, Bolivia. Genus *Dalla*. The type lacks the abdomen so the sex is uncertain, but there is a male paratype.

CUSILLUNIA Weeks, PAMPHILA. 1901, Ent. News, xii, p. 267. 1905, Ill. Diurn. Lep., i, p. 54, pl. xv, fig. 3. Near Cusilluni, Bolivia. Genus *Perimeles*. A synonym of *remus* Fabricius. The type is a male.

DIFFICILIS Weeks, GORGYTHION. 1901, Proc. New England Zool. Club, ii, p. 82. 1905, Ill. Diurn. Lep., i, p. 50, pl. xiv, fig. 2. Near Cochabamba, Bolivia. Genus *Quadrus*. The type is a male.

DUOVATA Weeks, BUTLERIA. 1901, Proc. New England Zool. Club, ii, p. 89. 1905, Ill. Diurn. Lep., i, p. 66, pl. xxiv, fig. 2. Near Coroico, Bolivia. Genus *Dalla*. A synonym of *diraspes* Hewitson. The type lacks the abdomen and antennae so the sex is uncertain.

DUSPECCA Weeks, COBALOPSIS. 1902, Ent. News, xiii, p. 105. 1905, Ill. Diurn. Lep., i, p. 71, pl. xxvi, fig. 2. Coroico, Bolivia. Genus *Cobalus*. A synonym of *cannae* Herrich-Schaffer. The type is a male.

ELIDES Weeks, CALLIMORMUS. 1909, Ent. News, xx, p. 263. 1911, Ill. Diurn. Lep., ii, p .29, pl. xxi, fig. 1. Suapure, Venezuela. Genus *Lerodea* (*Megistias auct.*).Synonym of *telata* Herrich-Schaffer. The type is a female.

ERRATOR Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 73. 1905, Ill. Diurn. Lep , i, p. 53, pl. xv, fig. 1. Coroico district, Bolivia. Genus Lerodea. The type is a female, but there are two male paratypes.

FERA Weeks, ARCHLYODES. 1901, Proc. New England Zool. Club, ii, p 107. 1905, Ill. Diurn. Lep., i, p. 67, pl. xxiv, fig. 3. Bolivia. The examination of the female type was not conclusive as to the generic alliance.

FINITIMUS Weeks, TELEGONUS. 1901, Proc. New England Zool. Club, ii, p. 104. 1905, Ill. Diurn. Lep., i, p. 90, pl. xxxviii, fig. 2. Bolivia. Genus *Perichares* The type is a male.

GUILFORDI Weeks, ACHLYODES. 1901, Proc. New England Zool. Club, ii, p. 106. 1905, Ill. Diurn. Lep., i, p. 94, pl. xli, fig. 1. Coroico, Bolivia. Genus *Pellicia*. A synonym of *costimacula* Herrich-Schaffer. The type is a male.

HIRTA Weeks, PYTHONIDES. 1901, Can. Ent., xxxiii, p. 321. 1905, Ill. Diurn. Lep., i, p. 104, pl. xlv, fig. 2. Bogota district, Colombia. Genus *Potamanaxas*. Possibly a synonym of *paralus* Godman & Salvin. The type lacks the abdomen so the sex is uncertain.

HOYTI Weeks, PYTHONIDES. 1906, ENT. NEWS, xvii, p. 202. 1911, Ill Diurn. Lep., ii, p. 10, pl. vi, fig. 2. Suapure, Venezuela. Genus *Telemiades*. The type appears to be a female.

HURLEYI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 97. 1905, Ill. Diurn. Lep., i, p. 72, pl. xxvii, fig. 2. Bolivia. Genus *Dalla*. A synonym of *ibhara* Butler. The type is a male.

IDEE Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 86. 1905, Ill. Diurn. Lep., i, p. 79, pl. xxx, fig. 1. La Paz, Bolivia. Genus *Lerema* The type is a male.

KIKKAWAII Weeks, PLESTIA. 1906, Can. Ent., xxxviii, p. 177. 1911, Ill. Diurn. Lep., ii, p. 9, pl. vi, fig. 1. Suapure, Venezuela. Genus *Hydraenomia*. Allied to, and probably a synonym of, *orcinus* Felder. The type is a male.

LEOPARDUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 96. 1905, Ill. Diurn. Lep., i, p. 73, pl. xxviii, fig. 1. Bolivia. Genus *Eutocus*. A synonym of *lucia* Capronnier. The type is a female.

MELCHERI Weeks, ACHLYODES. 1906, Can. Ent., xxxviii, p. 176. 1911, Ill. Diurn. Lep., ii, p. 27, pl. xix. Suapure, Venezuela. Genus *Pellicia*. Lindsey placed *melcheri* as a synonym of *licisca* Plotz and a superficial comparison of a specimen of *licisca* with the type of *melcheri* seems to confirm this synonymy. The type is a male.

MENGELI Weeks, PAMPHILA. 1906, Psyche, xiii, p. 68. 1911, Ill. Diurn. Lep., ii, p. 17, pl. xi, fig. 1. Suapure, Venezuela. Genus *Chaerephon*. A synonym of *vesana* Weeks, as stated below, being merely a somewhat paler form with the veins on the underside of the secondaries more prominently pale. The type is a male.

MENUDA Weeks, NISONIADES.. 1902, Proc. New England Zool Club, iii, p. 4. 1905, Ill. Diurn. Lep., i, p. 101, pl. xliv, fig. 2. Bolivia. Genus *Pholisora (Staphylus auct.)*. The type is a male and has a costal fold.

MILESI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 88. 1905, Ill. Diurn. Lep., i, p. 81, pl. xxxi, fig. 2. Coroico district, Bolivia. Lindsey placed this species in *Tirynthia*, but whether it belongs here or in *Cobalus* is uncertain as the type is a female.

NAKAWARA Weeks, ERYCIDES. 1906, Psyche, xiii, p. 70. 1911, Ill. Diurn. Lep., ii, p. 20, pl. xiii. Suapure, Venezuela. Genus *Phocides*. A synonym of *distans* Herrich-Schaffer. The type is a female.

NIGELLA Weeks, SYRICHTHUS. 1902, ENT. NEWS, xiii, p. 107. 1905, Ill. Diurn. Lep , i, p. 76, pl. xxix, fig. 1. Sicasica, Bolivia. Genus *Pyrgus*. Related to *biseriatus* Weymer but with more spots on the upper side of the secondaries. The type is a female but there is a male specimen in the series of three. The male has no costal fold but has a tibial tuft. The very long white fringes of the female are not well shown in the figure given by Weeks.

PARKERI Weeks, THANAOS. 1906, Psyche, xiii, p. 72. 1911, Il. Diurn. Lep., ii, p. 19, pl. xii, fig. 2. Suapure, Venezuela. Genus *Erynnis (Thanaos auct.)*. *Parkeri* has considerable similarity with *heteropterus* Plotz and may be a synonym of that species, but certain differences in maculation and the more pointed primaries of *parkeri* render it necessary to compare

the form of the genitalia in order to determine their exact relationship. The type is a male.

PELAGICA Weeks, PYRGUS. 1891, Can. Ent., xxiii, p. 126. 1905, Ill. Diurn. Lep., i, p. 4, pl. 1, fig. 5. Near San Jose del Cabo, Lower California. Genus *Chiomara*. A synonym of *asychis* Cramer. The type is a male.

PLANUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 95. 1905, Ill. Diurn. Lep., i, p. 80, pl. xxxi, fig. 1. Bolivia. Genus *Methionopsis*. The stigma of the male type is the same as that of *ina* Plotz but rather more heavily developed. The type is a very large individual and has the pale anal angle area of the underside of the primaries not so prominently shown as in *ina*.

PLUMMERTINI Weeks, NISONIADES. 1906, Psyche, xiii, p. 73. 1911, Ill. Diurn. Lep., ii, p. 18, pl. xii, fig. 1. Suapure, Venezuela. Genus *Pholisora (Staphylus auct.)*. A synonym of *mazans* Reakirt. The type is a male.

REEDI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 86. 1905, Ill. Diurn. Lep., i, p. 70, pl. xxvi, fig. 1. Coroico district, Bolivia Genus *Dalla*. The type is a male.

REEDII Weeks, PYRRHOPYGOPSIS. 1901, Can. Ent., xxxiii, p. 295. 1905, Ill. Diurn. Lep., i, p. 57, pl. xvii. Five days north of Cochabamba, Bolivia. Genus *Pyrrhopygopsis*. A synonym of *quispica* Plotz, as has been noted by previous authors. The type is a male.

RICHARDI Weeks, CARYSTUS. 1906, ENT. NEWS, xvii, p. 199. 1911, Ill. Diurn Lep., ii, p. 7, pl. iv, fig. 3. Suapure Venezuela. Genus *Vettius*. A synonym of *lafrenaye* Latreille. The type is a female.

SEATONI Weeks, ACHLYODES. 1901, Proc. New England Zool. Club, ii, p. 108. 1905, Ill. Diurn. Lep., i, p. 95, pl. xli, fig. 2. 200 miles north of Cochabamba, Bolivia. Genus *Quadrus*. A synonym of *narycus* Mabille. The type is a male.

SEPTIMANUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool Club, ii, p. 104. 1905, Ill. Diurn. Lep., i, p. 83, pl. xxxii, fig. 2. Chulumani, Bolivia. Genus probably *Cobalus*. The type is a female.

SERENUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 93. 1905, Ill. Diurn. Lep., i, p. 56, pl. xvi, fig. 3. Near Coroico, Bolivia. Genus *Lerodea (Megistias auct.)*. The type lacks the abdomen so the sex is uncertain, but there is another male paratype, and two other specimens, a male and a female, in the series which may not be conspecific with the type and paratype.

TABERI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 95. 1905, Ill. Diurn. Lep., i, p. 74, pl. xxviii, fig. 2.

Cochabamba, Bolivia. Genus probably *Cobalus*. There is no apparent stigma on the primaries of the type, but the superficial examination was not conclusive as to the sex.

TIHONETA Weeks, NICONIADES. 1901, Can. Ent., xxxiii, p. 323. 1905, Ill. Diurn. Lep., i, p. 62, pl. xxii, fig. 1. Near La Paz, Bolivia. Genus *Thespius*. The type is a male.

TRITONAE Weeks, TELEGONUS. 1901, Proc. New England Zool. Club, ii, p. 105. 1905, Ill. Diurn. Lep., i, p. 85, pl. xxxiv. Near Chulumani, Bolivia. Genus *Celaenorrhinus*. The type and two paratypes are females.

VERDANTA Weeks, PAMPHILA. 1906, Psyche, xiii, p. 67. 1911, Ill. Diurn. Lep., ii, p. 16, pl. x, fig. 2. Suapure, Venezuela. Genus *Metrocles*. Probably a synonym of *oropa* Hewitson. The type is a male.

VESANA Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 80. 1905, Ill. Diurn. Lep., i, p. 55, pl. xvi, fig. 1. Yacanachi district Bolivia. Genus *Chaerephon*. *Mengeli* Weeks and *lindseyi* Bell are both synonyms of *vesana* Weeks. The type is a male.

VIRIDENEX Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 80. 1905, Ill. Diurn. Lep., i, p. 52, pl. xiv, fig. 3. Five days north of Cochabamba, Bolivia. Genus probably *Atrytone*. The type is a male.

WARRENI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 93. 1905, Ill. Diurn. Lep., i, p. 77, pl. xxix, fig. 2. Coroico, Bolivia. Genus *Amblyscirtes*. The type is a female and there is one male paratype.

WINSLOWI Weeks, PAMPHILA. 1906, Psyche, xiii, p. 69. 1911, Ill. Diurn. Lep., ii, p. 15, pl. x, fig. 1. Suapure, Venezuela. Genus *Catia*. A synonym of *otho* race *curassavica* Snellen, which represents the race of *otho* Abbot & Smith from Curacao, Trinidad, Panama and parts of South America. This race is distinguished by the more extended and paler yellowish maculation of the upper side, the paler yellow color of the under side, and the rather distinct yellow stripe in the cell of the upper side of the secondaries. The type is a male.

Stridulating Organs of Female Tettigoniidae (Orthoptera).

By B. B. FULTON, N. C. State College, Raleigh, North Carolina.

The literature on the Orthoptera contains a number of records in which an observer claims to have heard calls by the female of some species of Tettigoniidae. Riley, describing the song of *Scudderia furcata*, says "the call is occasionally re-

sponded to by a faint chirp from the females, produced by stretching out their wings as if for flight." He described the prolonged rattling song of *Microcentrum rhombifolium* and says that it "is invariably answered by a sharp 'chirp' or 'tschick' from one or more females who produce the sound by a sudden upward jerk of the wings." Were it not for the last statement one would strongly suspect that he had heard the other type of male song, which he apparently failed to recognize.

Caudell has reported that the female katydid (*Pterophylla*) makes a sharp scraping noise when handled, and this observation has been confirmed by Allard, who also reports that he has heard the females of other species of Tettigoniidae making a noise of their own accord out of doors, and mentions specifically *Scudderia curvicauda, Amblycorypha rotundifolia,* and *Microcentrum rhombifolium.* He says that "these call notes appear to be in the nature of true sex calls or invitations to the males, for a number of these in every instance at once congregated about her, some of them flying from the shrubbery around."

My own observations include instances of stridulation by females of three species of Tettigoniidae. Late one afternoon I heard five sharp but not loud sounds like "tsip," coming from a small bush in which only a female *Microcentrum rhombifolium* could be located. At another time while collecting after dark I heard close by a faint ticking sound. I turned my flash light in the direction of the sound and saw a female *Amblycorypha rotundifolia.* She did not repeat the sound but no other insect could be found at that place.

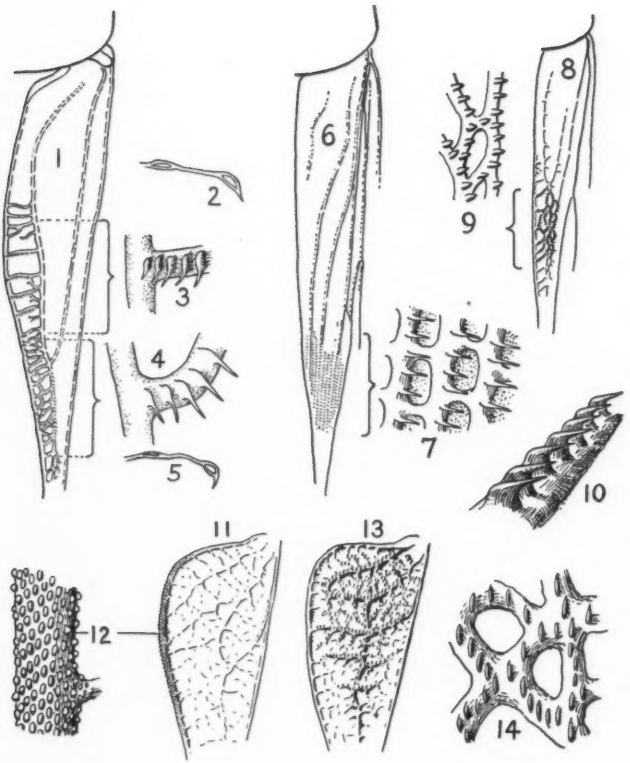
A more striking observation was made on *Scudderia texensis.* While sitting on the porch one night I heard a male of this species singing in the lot next door and noticed that immediately after it sang, a brief series of faint tapping sounds came from a cedar tree at the edge of the porch. With a flash light I located a female in the tree and saw it produce the sound by working the tegmina in a manner similar to the male. The reply always came about a half second after the conclusion of the male song. I caught the female to verify the species and turned it loose again. A little later I heard a similar reply coming from another cedar tree at the edge of the lot and found another female there. Presently the male came to this

second tree and each time its song ended both females could be heard simultaneously. The female in the further tree remained on the branch where first found and the male crawled over to her. Later a spermatophore was found attached to her.

On another night I heard at a distance of about 30 feet a faint sound like "chp," following the prolonged ticking song of *Microcentrum rhombifolium*. This was repeated nearly every time a *Microcentrum* sang within a radius of about 40 yards. I located the female in a low tree branch and watched her make the noise by spreading the dorsal edges of the tegmina a few millimeters and closing again. I went on past the tree to listen to another insect but noticed that a male *Microcentrum* sang twice in the upper branches of the tree and that the female replied each time. I heard no more of this male and after several minutes I went back to look at the female. I found her licking the abdomen of a male who was humped up so that the closed tegmina were perpendicular to the leaf it was standing on. The female had a large spermatophore attached to her.

The last two observations agree with Allard's statement that the males come to the females. The females did not move from the places where they were first discovered. If the males are guided only by the faint replies made to their songs, they must have a remarkable ability to locate sounds.

For a long time the writer supposed that the sounds made by female Tettigoniidae were produced by merely striking the overlapping anal areas of the tegmina together. This theory was rejected when it was found that a faint rasping noise could be produced by manipulating the tegmina of a recently killed female *Scudderia*. The specimen was examined under a binocular microscope and there it was noticed that a portion of the edge of the left or upper tegmen near the caudal part of the anal area was bent downward to form a scraper (Fig. 5) and that when it was dragged over the anal area of the right tegmen a rasping sound was produced. The right tegmen at this point bears a patch of minute stout spines (Fig. 4) projecting from the veins and directed diagonally backward and to the right so as to catch in the recurved margin of the left tegmen when the two are moved apart. Anterior to this area there are trans-



Stridulating organs of female Tettigoniidae. Fig. 1. Anal area of right tegmen of *Scudderia curvicauda* showing spined veins. Figs. 2 and 5. Cross sections of margins of left tegmen showing scrapers for anterior and posterior sets of spines, respectively. Fig. 3. Anterior spines, enlarged. Fig. 4. Posterior spines. Fig. 6. Anal area, right tegmen of *Neoconocephalus triops*, showing patch of spines. Fig. 7. Enlarged portion. Fig. 8. Anal area, right tegmen of *Orchelimum concinnum*. Fig. 9. Enlarged portion. Fig. 10. *Microcentrum rhombifolium*, perspective of spines on one of anterior transverse veins. Fig. 11. Anal area, right tegmen of *Pterophylla camellifolia*. Fig. 12. Vein on inner margin. Fig. 13. Ventral surface, anal area, left tegmen of *Pterophylla*. Fig. 14. Enlarged portion.

verse veins near the margin which bear rows of minute knobs (Fig. 3) each with a stiff spine directed posteriorly and nearly parallel to the tegmen surface. At this level the margin of the left tegmen projects downward with a sharp edge (Fig. 2) but is not recurved or hooked. This edge catches on the spined knobs when moving either direction but more so when the tegmina are coming together.

Although the structures described are minute, they appear to be specialized stridulating organs. The anal edge of the right tegmen does not project to the same extent and is nowhere recurved. The left tegmen does not bear any spines and does not have any well developed transverse veins. The right tegmen of the male has some spines along the veins in the posterior part of the anal area, but they are much more delicate in structure than those of the female.

After making this discovery the writer went through his collection, which contains nearly all the common eastern Tettigoniidae and many western species, and examined the females. Every species in which the female has overlapping tegmina was found to have some form of female stridulating organ. All species examined in the genera, *Scudderia* (8 spp.), *Amblycorypha* (5 spp.), *Microcentrum* (2 spp.), *Inscudderia*, and *Symetropleura* have an apparatus very similar to the one described above. In *Microcentrum* the spines (Fig. 10) are unusually well developed.

The species of *Neoconocephalus* (Figs. 6, 7) and *Pyrogocorypa unicincta* have an area of spines only at the caudal part of the anal area. All species of *Orchelimum* (Figs. 8, 9) examined (13 spp.) have well developed areas of very short blunt spines mostly in the caudal part of the anal area, but in some species extending farther forward somewhat as in *Scudderia*. *Conocephalus* (12 spp. examined) has less well developed patches of blunt spines. They were found even in *C. saltans* which has very abbreviated tegmina.

Among the Decticinae only three species having overlapping tegmina in the female were found in the collection. *Capnobotes fuliginosa* and *C. occidentalis*, have long tegmina with a patch of scattered but well developed spines on the caudal portion of the anal area of both tegmina. *Apote notabilis* has small ovoid

tegmina with a well developed scraper on the left and an extensive area of conical erect spines on the right.

Pterophylia camellifolia, the true katydid, has an apparatus similar to those described, but the spines are relatively few and scattered. This species however has another structure which is apparently designed for sound production. The vein bounding the anal area of the right tegmen only (Fig. 11) is large and well rounded above and for a considerable part of its length is thickly studded above with very minute but prominent knobs (Fig. 12) arranged in regular diagonal rows. The under surfaces of the anal areas of both tegmina have a network of prominent veins (Fig. 13) bearing many short ridges or keels (Fig. 14) all directed parallel to the length of the tegmen regardless of the direction of the vein. They are most numerous in the central portion of the anal area where those on the left tegmen would scrape over the file-like vein bordering the right if the tegmina were slightly spread apart.

No stridulating organ could be found on females of any of the Gryllidae. Baumgartner claims that the female *Gryllotalpa* has a loud distinct chirp and that in both this genus and *Scapteriscus* the females have stridulating organs. The writer has not been able to locate any file or spines on any of the veins on either surface of the tegmina in any of the female mole crickets in his collection.

A distinctly audible sound can be produced by manipulating the tegmina of a freshly killed female of any species of Tettigoniidae as large as an *Orchelimum.* A very faint sound can be produced with species as small as *Conocephalus fasciatus.* Such sounds have been heard in nature only from those species in which the males sing at irregular intervals. With many species the males keep up such a constant noise that the female reply, if made, could not be heard, at least by human ears. It is probable that only females in a certain "mood" or physiological state reply to the calls of the male.

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Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual volume, and in some cases the part, heft, &c. the latter within ( ) follows; then the pagination follows the colon :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞*Note the change in the method of citing the bibliographical references, as* explained above.

Papers published in the Entomological News are not listed.

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GULLIVER IN THE BUSH. Wanderings of an Australian Entomologist. By H. J. CARTER. Angus & Robertson, Ltd., Sydney. 234 pp., plates. Price, 6 sh. A book of interesting reading, especially for entomologists of Australia or who contemplate travelling there for collecting. Scientifically, Mr. Carter is a "full" man. And as one would expect, one gets much more than entomological lore in these chapters. One sees the Australian countryside from a fresh viewpoint and is given interesting information concerning its entomology, botany, forestry and geology. The author enlivens the narrative with tales of folk met with and happenings on the road. He puts one in touch with those well known entomologists as J. J. Walker, George Masters, E. W. Ferguson, W. J. Rainbow and others. He tells of excursions into the habitats of many species of Coleoptera described from Australia and Tasmania. These excursions were made into the Blue Mountains, the costal and inland country of New South Wales, Highland Rainforests, Alpine Australia, Victoria, South Australia, Queensland, West Australia and Tasmania. E. T. CRESSON, JR.

Silk worm Gut.

A gut used for surgical and fishing purposes is made from the intestines of silkworms which would otherwise form the silk spinning apparatus. These are extracted, dried and packed in bundles. Millions of worms are killed at a time for this purpose in Spain, Formosa, Italy, Japan and India. [ENT. RECORD.]

ENTOMOLOGICAL NEWS

VOLUME XLIV, 1933

CHARLES WILLISON JOHNSON
1863-1932.

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PUBLISHED BY
THE AMERICAN ENTOMOLOGICAL SOCIETY,
PHILADELPHIA, PA.:
THE ACADEMY OF NATURAL SCIENCES
LOGAN SQUARE
1933

The several numbers of the NEWS for 1933 were mailed at the Post Office at Philadelphia, Pa., as follows:

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" 2—February.....February 6
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" 4—April.....April 13
" 5—May ....May 2
" 6—June .....June 6
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